

Specification (SPEC)

FLAKY FINE POWDER, PRODUCTION THEREOF, AND COSMETIC

Cross Reference to a Related Application

SPD  
2/16/05

This is a continuation in part of U.S. application Serial No. 08/671,943, filed February 27, 1998 which is a continuation of U.S. application Serial No. 08/671,943, filed June 28, 1996, now abandoned, which is a continuation of U.S. application Serial No. 07/969,176 filed February 12, 1993, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

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The present invention relates to a flaky, fine powder which is used as a mixing or compounding agent for cosmetics, pigments and paints, or as a filler for use with such materials as plastics, and production thereof. Furthermore, the present invention relates to cosmetics in which the aforesaid flaky, fine powder is mixed or compounded.

2. Description of Related Art

A flaky, fine powder has been used as a compounding agent for such materials as cosmetics, pigments and paints, or as a filler for such materials as plastics, and this type of flaky, fine powder, produced by covering the surface of a flaky substance such as mica as a base with metal oxide or other appropriate material is well known.

This type of flaky, fine powder is produced by precipitating hydroxide from aqueous solution of metallic salt under coexistence with a flaky substance as a base and depositing said hydroxide on the surface of the flaky substance.

1. A method of producing a flaky fine powder, comprising:

adding alkoxysilane and/or silicic acid solution to a dispersion containing a flaky or scaly base and spherical silica particles, and

immobilizing said spherical silica particles on the surface of said flaky or scaly base by hydrolyzing said alkoxysilane and/or gelling said silicic acid solution,

said flaky or scaly base having a thickness of about 1  $\mu\text{m}$  or less and is selected from the group consisting of mica, talc and platelet shaped silica, and said spherical silica particles comprise  $\text{SiO}_2$  or a mixture of  $\text{SiO}_2$  with one or more of  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{MgO}$ ,  $\text{ZnO}$ ,  $\text{CeO}_2$  or  $\text{Fe}_2\text{O}_3$ , said spherical silica particles being non-porous and having an average particle size of 0.05-3  $\mu\text{m}$ ,

wherein the permittivity ( $\epsilon$ ) of said dispersion is in the following range:

$$15 \leq \epsilon \leq 80$$

and the ion concentration (N) of the sum of cations and anions in said dispersion satisfies the following conditions:

(a)  $200 \text{ ppm} \leq N \leq 5 \cdot 10^4 \text{ ppm}$ , when  $\epsilon$  is 15,

(b)  $3 \cdot 10^4 \text{ ppm} \leq N \leq 2 \cdot 10^5 \text{ ppm}$ , when  $\epsilon$  is 80, and

(c) N is in a quadrilateral area formed by A (15, 200), B (15,  $5 \cdot 10^4$ ), C (80,  $2 \cdot 10^5$ ) and D (80,  $3 \cdot 10^4$ ) in the (X,Y) coordinate system with the X axis for the permittivity ( $\epsilon$ ) (-) and the Y axis for the ion concentration (N) (ppm), when  $15 \leq \epsilon \leq 80$ .

2. A method of producing a flaky fine powder comprising:

(a) dispersing a flaky or scaly base having a thickness of about 1  $\mu\text{m}$  or less selected from the group consisting of mica, talc and platelet shaped silica, and spherical silica particles

comprised of  $\text{SiO}_2$  or a mixture of  $\text{SiO}_2$  with one or more of  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{MgO}$ ,  $\text{ZnO}$ ,  $\text{CeO}_2$  or  $\text{Fe}_2\text{O}_3$ , in a dispersion medium comprising an organic solvent and/or water, to adhere said spherical silica particles on the surface of said flaky or scaly base, and

(b) adding alkoxysilane and/or silicic acid solution to the obtained dispersion,

said spherical silica particles being non-porous and having an average particle size of  $0.05\text{-}3\text{ }\mu\text{m}$  and immobilized on the surface of said flaky or scaly base by hydrolyzing said alkoxysilane and/or gelling said silicic acid solution,

wherein the permittivity ( $\epsilon$ ) of said dispersion is in the following range[;]:

$$15 \leq \epsilon \leq 80$$

and the ion concentration (N) of the sum of cations and anions in said dispersion satisfies the following conditions:

(a)  $200\text{ ppm} \leq N \leq 5 \cdot 10^4\text{ ppm}$ , when  $\epsilon$  is 15,

(b)  $3 \cdot 10^4\text{ ppm} \leq N \leq 2 \cdot 10^5\text{ ppm}$ , when  $\epsilon$  is 80, and

(c) N is in a quadrilateral area formed by A (15, 200), B (15,  $5 \cdot 10^4$ ), C (80,  $2 \cdot 10^5$ ) and D (80,  $3 \cdot 10^4$ ) in the (X,Y) coordinate system with the X axis for the permittivity ( $\epsilon$ ) (-) and the Y axis for the ion concentration (N) (ppm), when  $15 \leq \epsilon \leq 80$ .

9 3. A flaky, fine powder comprising a flaky or scaly base having a thickness of about  $1\text{ }\mu\text{m}$  or less and selected from the group consisting of mica, talc and platelet shaped silica; and spherical silica particles comprised of  $\text{SiO}_2$  or a mixture of  $\text{SiO}_2$  with one or more of  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{MgO}$ ,  $\text{ZnO}$ ,  $\text{CeO}_2$  or  $\text{Fe}_2\text{O}_3$ , and said spherical silica particles being non-porous and having an average particle size of  $0.05\text{-}3\text{ }\mu\text{m}$  and covering the surface of said flaky or scaly base.

10/4. The flaky, fine powder according to claim 3, wherein said spherical silica particles are immobilized on the surface of said flaky or scaly base by a hydrolysate of alkoxysilane and/or silica gel.

3/5. A method of producing a flaky fine powder comprising:

dispersing (a) a flaky or scaly base having a thickness of about 1  $\mu\text{m}$  or less selected from the group consisting of mica, talc and platelet shaped silica, and (b) spherical silica particles comprised of  $\text{SiO}_2$  or a mixture of  $\text{SiO}_2$  with one or more of  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{MgO}$ ,  $\text{ZnO}$ ,  $\text{CeO}_2$  or  $\text{Fe}_2\text{O}_3$ , in a dispersion medium,

said spherical silica particles being non-porous and having an average particle size of 0.05-3  $\mu\text{m}$ ,

said spherical silica particles being deposited on a surface of said flaky or scaly base in said dispersion medium, and a flaky, fine powder being obtained by filtering, washing and drying the obtained dispersion,

wherein the permittivity ( $\epsilon$ ) of said dispersion is in the following range:

$$15 \leq \epsilon \leq 80$$

and the ion concentration (N) of the sum of cations and anions of said dispersion satisfies the following conditions,

$$200 \text{ ppm} \leq N \leq 5 \cdot 10^4 \text{ ppm, when } \epsilon \text{ is } 15,$$

$$3 \cdot 10^4 \text{ ppm} \leq N \leq 2 \cdot 10^5 \text{ ppm, when } \epsilon \text{ is } 80, \text{ and}$$

N is in a quadrilateral area formed by A (15, 200), B (15,  $5 \cdot 10^4$ ), C (80,  $2 \cdot 10^5$ ) and D (80,  $3 \cdot 10^4$ ) in the (X,Y) coordinate system with the X axis for the permittivity ( $\epsilon$ ) (-) and the Y

axis for the ion concentration (N) (ppm), when  $15 \leq \epsilon \leq 80$ .

4 ~~6~~<sup>3</sup>. The method according to claim ~~5~~<sup>3</sup>, further comprising immobilizing said spherical silica particles on the surface of said flaky or scaly base by adding alkoxysilane and/or silicic acid solution to said dispersion.

5 ~~7~~<sup>3</sup>. The method according to claim ~~6~~<sup>3</sup>, further comprising immobilizing said spherical silica particles on said surface of said flaky or scaly base by adding alkoxysilane to said dispersion and hydrolysing said alkoxysilane.

6 ~~8~~<sup>5</sup>. The method according to claim ~~7~~<sup>5</sup>, wherein said alkoxysilane is a compound having the formula:



wherein R is an alkyl group with a carbon number of 1 to 7.

7 ~~9~~<sup>3</sup>. The method according to claim ~~8~~<sup>3</sup>, further comprising immobilizing said spherical silica particles on the surface of said flaky or scaly base by adding silicic acid solution to said dispersion, and gelling said solution.

11 ~~10~~<sup>11</sup>. A flaky, fine powder comprising a flaky or scaly base having a thickness of about 1  $\mu\text{m}$  or less selected from the group consisting of mica, talc and platelet shaped silica; and spherical silica particles comprised of  $\text{SiO}_2$  or a mixture of  $\text{SiO}_2$  with one or more of  $\text{Al}_2\text{O}_3$ ,  $\text{ZrO}_2$ ,  $\text{MgO}$ ,  $\text{ZnO}$ ,  $\text{CeO}_2$  or  $\text{Fe}_2\text{O}_3$ , and said spherical silica particles being non-porous and having an average particle size of 0.05-3  $\mu\text{m}$  which adhere to the surface of said flaky or scaly base.

12 ~~11~~<sup>11</sup>. The flaky, fine powder according to claim ~~10~~<sup>11</sup>, wherein said spherical silica particles are immobilized on said flaky or scaly base by hydrolysate of alkoxysilane, and/or silica gel.

13 ~~12~~. A cosmetic comprising a flaky fine powder produced according to the method of claim ~~1~~ <sup>5</sup>.

14 ~~13~~. A cosmetic comprising a flaky fine powder produced according to the method of claim 1.

15 ~~14~~. A cosmetic comprising a flaky fine powder produced according to the method of claim 2.

16 ~~15~~. A cosmetic comprising a flaky, fine powder as claimed in claim ~~3~~ <sup>9</sup>.

17 ~~16~~. A cosmetic comprising a flaky, fine powder as claimed in claim ~~4~~ <sup>10</sup>.

18 ~~17~~. A cosmetic comprising a flaky, fine powder as claimed in claim ~~10~~ <sup>11</sup>.

8 ~~23~~. A method of producing a flaky fine powder comprising:

hydrolyzing tetraethoxysilane in a dispersion containing mica flakes having a thickness of about 1  $\mu\text{m}$  or less, to thereby precipitate the silica and immobilize said silica on the surface of said mica flakes non-porous spherical silica particles having an average particle size of 0.05-3  $\mu\text{m}$ ,

wherein the permittivity  $\epsilon$  of said dispersion is in the following range;

$$15 \leq \epsilon < 80$$

and the ion concentration (N) of the sum of cations and anions in said dispersion satisfies the following conditions,

(a)  $200 \text{ ppm} \leq N \leq 5 \cdot 10^4 \text{ ppm}$ , when  $\epsilon$  is 15,

(b)  $3 \cdot 10^4 \text{ ppm} \leq N \leq 2 \cdot 10^5 \text{ ppm}$ , when  $\epsilon$  is 80, and

(c) N is in a quadrilateral area formed by A (15, 200), B (15,  $5 \cdot 10^4$ ), C (80,  $2 \cdot 10^5$ ) and D

$(80, 3 \cdot 10^4)$  in the  $(X, Y)$  coordinate system with the  $X$  axis for the permittivity ( $\epsilon$ ) (-) and the  $Y$  axis for the ion concentration ( $N$ ) (ppm), when  $15 \leq \epsilon \leq 80$ .